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BULLETIN

OF THE

TORREY BOTANICAL CLUB

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Vol. 49 No. 8

BULLETIN

OF THE

TORREY BOTANICAL CLUB

AUGUST, 1922

Philippine Basidiomycetes—V*

PAUL W. GRAFF

POLYPOREAE (*Con.*)

PORIA Persoon

PORIA LEUCOPLACA (Berk.) Sacc. Syll. Fung. **6**: 322. 1888.
Polyporus leucoplacus Berk.; Hooker, Flora Nov. Zeland. **2**: 180. 1855.

LUZON: Province of Benguet, Pauai, June, 1909, *R. C. McGregor, Bur. Sci. 8720*, at an elevation of 2,100 m., on decaying timber.

Collected previously in New Zealand and Java.

TRAMETES Fries

TRAMETES ASPERA (Jungh.) Bres. Hedwigia **53**: 69. 1912.
Polyporus asper Jungh. Flor. Crypt. Javae **1**: 61. 1838.
Polystictus asper Sacc. Syll. Fung. **6**: 224. 1888.

LUZON: vicinity of Manila, August, 1912, *Sanchez 26, 37*, growing on decayed logs.

Originally described from material collected in Java.

TRAMETES INCANA Lév. Ann. Sci. Nat. Bot. III. **2**: 196. 1844.

*The papers of this series already published have appeared as follows. Additions to the basidiomycetous flora of the Philippines. Philip. Jour. Sci: **8**: (Bot.) 299–309. *pl. 8–10.* 1913; Philippine Basidiomycetes, II. Philip Jour. Sci. **9**: (Bot.) 235–255. *pl. 2.* 1914; Philippine Basidiomycetes—III. Bull. Torrey Club **45**: 451–469. *pl. 15.* 1918; Philippine Basidiomycetes—IV. Bull. Torrey Club. **48**: 285–295. 1922.

[The BULLETIN for July (**49**: 189–222) was issued August 10, 1922.]

Polyporus incanus Lév.; Gaudichaud, Bot. Voy. Bonite **1**: 183. *pl. 137, f. 2.* 1846.

LUZON: Province of Bataan, Mount Mariveles, November, 1912, *P. W. Graff, Bur. Sci. S157, S158.*

This fungus was first collected in the Philippines by Gaudichaud-Beaupré, in 1836–37, on the visit of the corvette "La Bonite" to the port of Manila. The fungus has not been reported since, and it is with considerable pleasure that one of these three-quarter century old species is again collected.

TRAMETES PALEACEA Fr. Nov. Symb. Myc. 97. 1851.
Polyporus paleaceus Fr. Epicr. Myc. 471. 1838.

LUZON: Province of Bataan, Mount Mariveles, November 3–19, 1912, *P. W. Graff, Bur. Sci. 19098*, on a decaying log at an elevation of 400 m.

Previously reported from New Guinea.

TRAMETES CORRUGATUS (Pers.) Bres. Hedwigia **51**: 316. 1912.
Polyporus corrugatus Pers.; Gaudichaud, Bot. Voy. Uranie 172. 1826.
Polyporus fusco-badius Pers.; Gaudichaud, Bot. Voy. Uranie 172. 1826.
Polyporus scabrosus Pers.; Gaudichaud, Bot. Voy. Uranie 172. 1826.
Daedalea sanguinea Klotz. Linnaea **8**: 481. 1833.
Polyporus indecorus Jungh. Flor. Crypt. Javae **1**: 51. 1838.
Polyporus tegularis Lév. Ann. Sci. Nat. Bot. III. **5**: 131. 1846.
Hexagonia cruenta Mont. Syll. Gen. Spec. Crypt. 169. 1856.
Polystictus Persoonii Cooke, Grevillea **14**: 85. 1885.
Trametes nitida Pat. Jour. de Bot. **4**: 17. 1890.
Earliella cubensis Murr. Bull. Torrey Club **32**: 479. 1905.
Earliella corrugata Murr. Bull. Torrey Club **34**: 468. 1907.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 16027.*

This is a much described species of universal tropical distribution. It was first described from material collected in the island of Guam and has later been reported from West Africa, India, Ceylon, Java, Borneo, Sumatra, the Philippines, Australia, and the American tropics.

DAEDALEA Persoon

DAEDALEA LURIDA Lév. Ann. Sci. Nat. Bot. III. **2**: 189. 1844.
Daedalea subconfragosa Murr. Bull. Torrey Club **35**: 415. 1908.

LUZON: Province of Rizal, January, 1906, *F. W. Foxworthy, Bur. Sci 22* (type of *Daedalea subconfragosa* Murr.). MINDANAO: District of Davao, Lake Laneo, Camp Keithley, July, 1907, *Mary S. Clemens "V"*.

Murrill's species, described from Philippine material, seems to be without doubt identical with that described by Léveillé from Javan specimens.

DAEDALEA PALISOTI Fr. Syst. Myc. **2**: 335. 1821.
Daedalea amanitoides Beauv. Fl. Owar. **1**: 44. *pl. 25*. 1804.
Daedalea repanda Pers.; Gaudichaud, Bot. Voy. Uranie 168. 1826.
Daedalea applanata Klotz. Linnaea **8**: 481. 1833.
Lenzites Palisoti Fr. Epicr. Myc. 404. 1838.
Lenzites repanda Fr. Epicr. Myc. 404. 1838.
Lenzites applanata Fr. Epicr. Myc. 404. 1838.
Lenzites pallida Berk. Jour. Bot. **1**: 146. 1842.
Lenzites platypoda Lév. Ann. Sci. Nat. Bot. III. **2**: 180. 1844.

LUZON: Province of Rizal, Bosoboso, July, 1906, *M. Ramos, Bur. Sci. 1191*; Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 15951*, on fallen and decayed tree trunk. CULION: October, 1903, *Merrill 3531*. NEGROS: Gimagaan River, January, 1904, *Copeland 21*.

Daedalea indica Jungh., described from Javan material, should in all probability be added to the list of synonyms of this species. *Daedalea*, in the Polyporaceae, and *Lenzites*, in the Agaricaceae, are so closely related, and the species of one so often show a strong tendency to a variation toward the other, that considerable confusion has arisen in their determination. This is especially true in the case of this species and *D. flavida* Lév. in the Philippine material. In the latter species the variation even goes further, producing a *Trametes* form.

The types of both Léveillé's and Berkeley's species are from material collected in the Philippines. This species is of very general tropical distribution.

DAEDALEA PRUINOSA Lév. Ann. Sci. Nat. Bot. III. **2**: 199. 1844.

Hexagonia glabra Lév. Ann. Sci. Nat. Bot. III. **5**: 143. 1846.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 16015*.

Collected previously in India and the Hawaiian Islands.

Daedalea versatilis (Berk.) comb. nov.

Trametes versatilis Berk. Jour. Bot. **1**: 150. 1842.

Hexagonia ciliata Klotz. Nov. Act. Acad. Nat. Cur. **19**: (Suppl.) 235. *pl. 5, f. 1*. 1843.

Polystictus versatilis Sacc. Syll. Fung. **6**: 244. 1888.

Funalia versatilis Murr. Bull. Torrey Club **34**: 469. 1907.

LUZON: Province of Bataan, Lamao, February, 1904, *Williams*.

As represented in Philippine material this species is of a decidedly daedaleoid type. Occasionally *Trametes*-like forms are collected, showing that it may merge into the type of plant described by Berkeley. These forms are rare, however, as also are such as might tend toward the genus *Polystictus*.

Collected in the American tropics and the Philippines.

ELMERINA Bresadola

ELMERINA CLADOPHORA (Berk.) Bres. Hedwigia **51**: 319. 1912.

Hexagonia cladophora Berk. Jour. Linn. Soc. Bot. **16**: 47. 1878.

LUZON: Province of Nueva Ecija, Cabanatuan, October, 1908, *R. C. McGregor, Bur. Sci. 5272*; Province of Rizal, Jalajala, October, 1910, *C. B. Robinson, Bur. Sci. 11925*.

Reported only from the Philippines.

ELMERINA VESPACEA (Pers.) Bres. Hedwigia **51**: 319. 1912.

Hexagonia vespacea Pers.; Gaudichaud, Bot. Voy. Uranie 170. 1826.

Lenzites aspera Klotz. Linnaea **8**: 480. 1833.

Polyporus lacerus Jungh. Flor. Crypt. Javae **1**: 65. 1838.

Daedalea inconcinna Berk. Jour. Bot. **1**: 151. 1842. Not Deless.

Lenzites platyphylla Lév. Ann. Sci. Nat. Bot. III. **2**: 179. 1844.

Daedalea aulaxina Lév. Ann. Sci. Nat. Bot. III. **2**: 197. 1844.

Hexagonia Molkenboeri Lév. Ann. Sci. Nat. Bot. III. **2**: 200 1844.

Hexagonia macrotrema Jungh.; Fries, Symb. Myc. 101. 1851.

Hexagonia albida Berk. Jour. Linn. Soc. Bot. **16**: 47. 1878.
Hexagonia Cesati Berk.; Cesati, Myc. Born. 8. 1879.
Daedalea pruinosa Ces. Myc. Born. 7. 1879. Not Léveillé.
Daedalea intermedia Berk. Jour. Linn. Soc. Bot. **18**: 385. 1879.
Lenzites nivea Cooke, Grevillea **15**: 94. 1886.
NEGROS: Province of Negros Oriental, Dumaguete, April, 1908, *Elmer 9860*.
Collected in Hawaii, Mauritius, Surinam, and Java.

HEXAGONIA Fries

HEXAGONIA APIARIA (Pers.) Fr. Epicr. Myc. 497. 1836.
Polyporus apiarius Pers.; Gaudichaud, Bot. Voy. Uranie 172. 1826.
Hexagonia Koenigii Berk. Ann. Nat. Hist. II, **10**: 379. 1853.
LUZON: Province of Bataan, November, 1909, *H. M. Curran, For. Bur. 1922ó*.
Collected in Java, Ceylon, and the Rawak Islands.

Hexagonia Clemensiae (Murr.) comb. nov.
Inonotus Clemensiae Murr. Bull. Torrey Club **35**: 401. 1908.
Polyporus Clemensiae Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 272 1912.
MINDANAO: District of Davao, Lake Laneo, Camp Keithley, September–October, 1907, *Mary S. Clemens*, on dead wood.
Not reported as yet outside the Philippine Islands.

HEXAGONIA CUCULLATA (Mont.) Murr. Bull. Torrey Club **31**: 332. 1904.
Favolus cucullatus Mont.; Ramon de la Sagra, Hist. Phys. Polit. Nat. Cuba **9**: 378. 1841.
Favolus curtipes Berk. & Curt. Jour. Bot. Kew Gard. Miscel. **1**: 234. 1849.
Hexagonia Taxodii Murr. Bull. Torrey Club **31**: 332. 1904.
LUZON, Province of Isabella, Palanan Bay, June, 1913, *Escritor, Bur. Sci. 21185*.
Collected in Ceylon, the West Indies, tropical America, and eastern United States.

Hexagonia subrubida (Murr.) comb. nov.
Hapalopilus subrubidus Murr. Bull. Torrey Club **34**: 470. 1907.

Polyporus subrubidus Sacc. & Trott.; Saccardo, Syll. Fung. **21**: 276. 1912.

LUZON: Province of Bataan, Mount Mariveles, November, 1904, *Elmer 6912*, on dead tree branches.

This species should have been transferred to the genus *Hexagonia* by Saccardo and Trotter instead of to the genus *Polyporus*, to which it does not belong.

So far only found in the Philippine Islands.

FAVOLUS Fries

FAVOLUS MEGALOPORUS (Mont.) Bres. Hedwigia **52**: 74. 1912.

Polyporus megaloporus Mont. Ann. Sci. Nat. Bot. IV. **1**: 124. 1854.

Favolus princeps Berk. & Curt. Jour. Linn. Soc. Bot. **10**: 321. 1869.

LUZON: Province of Nueva Vizcaya, Mount Umuguen, May 19, 1909, *M. Ramos, Bur. Sci. 8282.*

Reported from French Guiana, Cuba, and Java.

FAVOLUS MULITPLEX Lév. Ann. Sci. Nat. Bot. III. **2**: 203. 1844.

LUZON: Province of Bataan, Balanja Mountains, January, 1910, *H. M. Curran, For. Bur. 19252.*

According to the collector's note this fungus is edible and used by the Negritos of Bataan Province as a food.

This species has been previously reported from Brazil and Java.

FAVOLUS SPATHULATUS (Jungh.) Lév. Ann. Sci. Nat. Bot. III, **2**: 203. 1844.

Laschia spathulata Jungh. Flor. Crypt. Javae **1**: 75. 1838.

Hymenogramme spathulata Sacc. & Cub.; Saccardo, Syll. Fung. **5**: 653. 1887.

MINDANAO: District of Davao, Mount Apo. September, 1909, *Elmer 11572.*

Previously collected in Java.

GLOEOPORUS Montagne

Gloeoporus reticulatus (Fr.) comb. nov.

Auricularia reticulata Fr. Epicr. Myc. 555. 1836.

Gloeoporus conchoides Mont.; Ramon de la Sagra, Hist. Phys. Polit. Nat. Cuba **9**: 385. *pl. 15, f. 1,* 1841.

Thelephora dolosa Lév. Ann. Sci. Nat. Bot. III. **2**: 209. 1844.

LUZON: Province of Laguna, Mount Maquiling, February, 1912, *P. W. Graff, Bur. Sci. 15952.*

Collected previously in Brazil, Cuba, and Java.

GLOEOPORUS DICHROUS (Fr.) Bres. Hedwigia **52**: 74. 1912.

Polyporus dichrous Fr. Obs. Myc. **1**: 125. 1815.

Boletus thelephoroides Hook.; Kunth, Syn. Plant. 10. 1822.

Boletus dichrous Spreng. Syst. Veget. **4**: 475. 1828.

Polyporus nigro-purpurascens Schwein. Syn. Fung. Amer. Bor. 360. 1831.

Polyporus pelleporus Secr. Mycogr. Suisse Champ. 73. 1833.

Polyporus thelephoroides Fr. Epicr. Myc. 473. 1836.

Gloeoporus candidus Speg. Fung. Guar. Pug. **1**: 30. 1883.

Polystictus thelephoroides Sacc. Syll. Fung. **4**: 284. 1886.

LUZON: Province of Rizal, January, 1906, *F. W. Foxworthy, Bur. Sci. 79.* MINDANAO: District of Davao, Mount Apo, May, 1909, *Elmer 10747.*

Collected in southern Europe, the American tropics, and Java.

LASCHIA Fries

LASCHIA MINIMA (Jungh.) Sacc. Syll. Fung. **6**: 409. 1888.

Polyporus minimus Jungh. Flor. Crypt. Javae **1**: 64. 1838.

MINDANAO: Subprovince of Butuan, March–July, 1911, *Weber 1229*, on decaying woods.

Reported previously from Java.

AGARICINEAE

PLEUROTUS Fries

PLEUROTUS FLABELLATUS Berk. & Br. Jour. Linn. Soc. Bot. **11**: 529. 1871.

LUZON: Province of Benquet, Baguio, December 5, 1910, *E. Fénix, Bur. Sci. 12948*, on dead wood.

Collected previously in tropical America, Ceylon, and South Africa.

LENTINUS Fries

LENTINUS FUSCO-PURPUREUS Kalchbr. Grevillea **8**: 153. 1880.

LUZON: Province of Rizal, Bosoboso, July, 1906, *M. Ramos, Bur. Sci. 1196.*

This species, while allied to *Lentinus Zeyheri* Berk., seems to be distinct.

Described from material collected on the Richmond River, Australia, and not previously reported from elsewhere.

LENTINUS JAVANICUS Lév. Ann. Sci. Nat. Bot. III. **5**: 118. 1846.

Lentinus Decaisneanus Lév. Ann. Sci. Nat. Bot. III. **5**: 120. 1846.

Lentinus infundibuliformis Berk. & Br. Jour. Linn. Soc. Bot. **14**: 42. 1875.

LUZON: Province of Bataan, Lamao, February 29, 1904, *Copeland 175.*

Previously reported from Java.

LENTINUS POLYCHROUS Lév. Ann. Sci. Nat. Bot. III. **2**: 175. 1844.

Lentinus praerigidus Berk. Jour. Bot. Kew Gard. Miscel. **6**: 132. 1854.

Lentinus Kurzianus Berk. & Curr. Trans. Linn. Soc. II. **1**: 120. *pl. 20, f. 2.* 1876.

LUZON: Province of Cagayan, Aparri, March, 1909, *H. M. Curran, For. Bur. 16819.*

Collected in Java, Sumatra, and eastern India.

LENTINUS SAJOR-CAJU (Rumph.) Fr. Epicr. Myc. 393. 1838.

Agaricus sajor-caju Rumph. Herb. Amb. **11**: 125, *pl. 56, fig. 1.* 1741–1755.

LUZON: Province of Bataan, Mount Mariveles, January, 1904, *Merrill 3704.*

Collected in Amboinia and Java.

LENTINUS TANGHINIAE Lév. Ann. Sci. Nat. Bot. III. **5**: 119. 1846.

MINDANAO: District of Davao, Todaya, March, 1904, *Copeland 516.*

Described from material collected in Madagascar.

LENTINUS VELUTINUS Fr. Linnaea **5**: 510. 1830.

Scleroma velutinum Fr. Epicr. Myc. 392. 1838.

Lentinus setiger Lév. Ann. Sci. Nat. Bot. III. **2**: 176. 1844.

Lentinus brachatus Lév.; Zollinger, Syst. Verz. Ind. Arch. **17**. 1854.

MINDANAO: District of Davao, Todaya, April, 1904, *Copeland.* Collected previously in Brazil, Cuba, and Guiana.

LENZITES Fries

LENZITES ACUTA Berk. Jour. Bot. **1**: 146. 1842.

LUZON: Province of Cagayan, March, 1909, *Becani, For. Bur. 16712.*

The gills in this species have a somewhat wavy margin as well as being notched and, while the majority of the longer ones are forked, most of the shorter are distinct.

This is the only collection which has been made of this fungus in the Philippines since Cuming's collection of the type, between 1836 and 1840. In the meanwhile the species has been collected in northern India.

LENZITES PLATYPHYLLA Lév. Ann. Sci. Nat. Bot. III. **2**: 179. 1844. Not Cooke.

LUZON: Province of Nueva Vizcaya, vicinity of Dupax, January–April, 1912, *R. C. McGregor, Bur. Sci. 14353. 20284;* Province of Bataan, Lamao, November, 1909, *H. M. Curran, For. Bur. 19188;* Mount Mariveles, January, 1910, *H. M. Curran, For. Bur. 19244a,* MINDANAO: District of Davao, Lake Lanao, Camp Keithley, September, 1907, *Mary S. Clemens.* Collected previously in Java and Guiana.

LENZITES STRIATA (Swartz) Fr. Epicr. Myc. 406. 1838.

Agaricus striatus Swartz, Prodr. Fl. Ind. Occ. 148. 1788.

Merulius striatus Lam. Encyc. Méth. Bot. **4**: 127. 1797.

Daedalea striata Fr. Syst. Myc. **1**: 334. 1821.

LUZON: Province of Bataan, Mount Mariveles, November 3–19, 1912, *P. W. Graff, Bur. Sci. 19044,* at an elevation of 350 m., on decaying and burned logs.

Previously collected in tropical America, (including the West Indies,) Australia, and Borneo.

SCHIZOPHYLLUM Fries

SCHIZOPHYLLUM COMMUNE Fr. Syst. Myc. **1**: 330. 1821.

Agaricus multifidus Batsch, Elench. Fung. **1**: 124. *f. 126.* 1786.

Scaphophorus agaricoides Ehrh.; Nees, Hor. Phys. Berol. 94. 1820.

Schizonia vulgaris Pers. Myc. Eur. **3**: 14. 1828.
Schizophyllum alneum Schröt.; Cohn, Krypt. Flor. Schles. **3**: 383. 1887.

LUZON: Province of Rizal, Bosoboso, July, 1906, *M. Ramos, Bur. Sci. 1195*; Panay, Iloilo, January 2, 1904, *Copeland 29*.

A fungus of universal distribution living on woody hosts of all sorts, both as a saprophyte and as a facultative parasite. After gaining entrance beneath the bark of living trees, through wounds, this species is able to slowly advance through the tissues which are apparently killed in advance of the progress of the fungus.

CREPIDOTUS Fries

CREPIDOTUS POGONATUS Kalchbr. Grevillea **9**: 131. 1880.

LUZON: Province of Nueva Vizcaya, vicinity of Dupax, January 14, 1913, *R. C. McGregor, Bur. Sci. 20251*, on decaying twigs.

Previously collected in East Africa.

PANAEOLUS Fries

PANAEOLUS PAPILIONACEUS (Bull.) Fr. Epicr. Myc. 236. 1836.
Agaricus equinus Alb. & Schw. Consp. Fung. Lus. 3. 1805.
Agaricus campanulatus Linn. Sp. Plant. 1175. 1753.
Agaricus carbon Batsch, Elench. Fung. 6. 1783.
Agaricus papilionaceus Bull. Hist. Champ. France 561. 1791–1798.
Agaricus varius Pers. Icon. Des. Fung. 40. 1800.
Panaeolus campanulatus Berk. Outl. Brit. Fung. 175. 1860.
Copelandia papilionacea Bres. Hedwigia **53**: 51. 1912.

LUZON: Province of Cagayan, Aparri, March, 1909, *H. M. Curran, For. Bur. 17143;* vicinity of Manila, September, 1905, *Merrill 5008*. MINDANAO: District of Davao, March 5, 1904, *Copeland 344*.

The formation of the new genus *Copelandia*, in which the sole distinction from *Panaeolus* is the presence of cystidia, is inviting for the future a confusion similar to that existing in the genera *Panus* and *Lentinus*, where the only difference exists in the presence or absence of notched gills. This characteristic, even though at present confined to this one species, is not a sufficient distinction for a generic character, or to insure

the possible acceptance of this as the type of a new genus. It seems the wisest course, therefore, to continue as before with the use of the Friesian name, at least till some character more positive may be found to warrant the change.

Previously reported from the United States, Europe, South Africa, southern Siberia, Ceylon, Borneo, and Australia as well as the Phillippines.

UNIVERSITY OF MONTANA,
MISSOULA, MONTANA

Occurrence of the pycnial stage of Puccinia Taraxaci*

LOUISE DOSDALL

On April 29, 1920, dandelions were found on University Farm, St. Paul, heavily infected with rust. In addition to the fact that this was the earliest date on record at the University of the occurrence of *Puccinia Taraxaci* (Rabent.) Plow., this collection was of particular interest because pycnia were found accompanying the uredinia. As far as could be discovered from the literature, this stage had never before been collected in North America, although both Plowright (1889) and Grove (1913) had reported its occurrence in England, and Jacky (1909) in Germany.

In the spring of 1921 a careful watch was kept for the first appearance of dandelion rust to determine whether or not the pycnial stage was common in this region. The first pycnia were found on University Farm, April 17, 1921. Subsequently they were found in various localities around St. Paul and Minneapolis. If a careful search was made, the pycnial stage could be found in almost any cluster of plants. A difference was noted in the abundance of the rust during the two seasons in which observations were made. In 1920 the pycnia were found accidentally in two localities. In both cases the infection on the plants was so conspicuous that the rust was observed while one was walking hurriedly through the field. In 1921 no pycnia could be found without the most diligent search.

Through correspondence with Dr. H. S. Jackson, it was learned that the pycnial stage of *Puccinia Taraxaci* had been collected at Brookville, Indiana, in April, 1918, by C. A. Ludwig, and the specimens deposited in the Arthur Herbarium. This specimen was compared with the Minnesota collection and the rusts found to be identical. In spite of the fact that collections are rare, it would seem that the occurrence of the pycnial stage must be rather common.

The pycnia of *Puccinia Taraxaci* are amphigenous on yellow, slightly swollen spots, which occur frequently along the midrib

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of the leaf but are found sometimes on the blade. They are reddish brown in color, subglobose in shape, about 90μ in diameter and 76μ in height. Ostiolar filaments are present. Uredinia appear on the same spots soon after the pycnia.

Midwinter botanizing in southern Arizona

EDWIN B. BARTRAM

As a large part of the literature relating to the desert flora of Southern Arizona is not readily accessible to any but professional botanists the following brief survey of the recognizable winter plants in the region tributary to Tucson may prove interesting and helpful to those fortunate enough to make the acquaintance of this fascinating country in the early months of the year.

From a botanical point of view the area is obviously more closely related to the Mexican state of Sonora than it is to any of our possessions so that many of its most characteristic plants are not represented at all in Wooton and Standley's invaluable Flora of New Mexico.

The preparation of specimens in this dry sunny climate is a simple operation; the surrounding mountains, or at least their foothills, are easy of access; and, as the representation of Arizona plants in most of our larger eastern herbaria is quite meagre, the ambitious collector finds an almost unlimited field in which to work. A surprising variety of flowers is evident even at this season and many plants whose period of bloom is past are recognizable by some peristent vestige of fruit or flowers.

Apart from such unique and unfamiliar plants as the sahuaro, chollas, candle bush, prickly pears and palo-verde, which claim the undivided attention of the newcomer until the novelty and charm of the first impressions are to a certain extent dulled by familiarity, the most striking feature of the desert vegetation is the isolation of various clearly defined plant communities. It is all desert, to be sure, but the wide gravel plains over which *Covillea glutinosa* is dominant and the barren spurs and talus slopes, sun baked, arid and almost devoid of plant life, excepting the hardiest drought-resisting species that have become inured to this environment, seem to resolve themselves readily into a series of barriers that from necessity restrict the distribution of many species to quite definitely circumscribed limits.

Distances in Arizona are proverbially deceptive, but we were hardly prepared to learn that the lower slopes of the Santa Catalina Mountains, which looked so enticingly near, were at

least fifteen miles away instead of under five miles as we had fondly imagined. The horses are willing and capable of covering thirty miles or more in a day without discomfort, but the first days experience proved conclusively that the one indispensable article of equipment was a good canteen; for, excepting a few canyons in the Catalina Range reaching well back into the forested and snow-covered slopes, water is never available. The higher peaks are heavily snow-capped during most of the winter months, although snow rarely descends to the level of the plains. After a rainy night in January it is not unusual to see the snow line across the slopes as straight as though it had been drawn with a ruler. In the sheltered canyons where snow rarely falls and never persists we found many flowering plants in early January which were materialy increased in number and variety with each succeeding week. Many plants are distributed generally over entire ranges but in each canyon, walled in by the steep arid intervening ridges, we found some species that were wanting in every other locality we visited.

Sabino Canyon in the Santa Catalina Mountains, distant some sixteen miles from Tucson, is one that we happened to reach quite frequently and will serve nicely as an example of these interesting localities. Leaving early we drive across the plains through miles of pungent greasewood with its curiously folded leaves and bright yellow flowers, which even now are giving way to the little felted spheres of fruit. Thickets of cholla, six or eight feet high, varying in color from pale green to ruddy brown and brightened with pendant clusters of orange colored fruit, glow in the early sunlight. *Cirsium neomexicanum*, *Lesquerella Fendleri*, and *Baileya multiradiata* are in bloom along the roadsides, the stiff wands of old fruit bend over colonies of gray-green *Atriplex canescens*, and here and there an occasional *Yucca elata* lifts its brown panicle of old fruit above the shrub level. In a broad belt along the base of the mountains the sahuaro gives a grass green tinge to the foothills ten miles away where the arroyos are marked by wavering lines of mesquite and desert willow. The hot rocky slopes flanking the mouth of the canyon are spotted with *Opuntia Bigelovii*, glistening like spicules of glass in the brilliant sunshine and undoubtedly the most vicious of all the chollas. A carpet of detached joints covers the ground about every plant, and woe to the unwary

walker who steps unguardedly into these precincts. The spines penetrate shoe leather like a steel needle and refuse to be withdrawn. Nature guards her wards well in these desert places and the animals, profiting by the example, guard their dens with a pile of these bristling joints, carried one by one at a cost easy to be reckoned by anyone unfortunate enough to have brushed against a stem in an unguarded moment.

Along the creek issuing from the canyon are many waifs from the higher zones, such as *Juniperus scopulorum*, *Yucca baccata*, *Quercus Emoryi*, *Q. oblongifolia* and *Q. hypoleuca*, but it is among the rocks on sheltered slopes in the canyon that we find the earliest flowers. Here the fairy dusters, *Calliandra eriophylla*, are just spreading their delicate balls of pink bloom, and clumps of *Lesquerella purpurea* are established in many congenial crevices. *Hermannia pauciflora* with the flowers well concealed among the matted woody stems is easily overlooked, and a form of *Anislotus puberulus* with showy golden yellow flowers and nearly leafless stems helps to brighten the otherwise barren ledges. *Notholaena Lemmoni* grows abundantly among the rocks of a dry sunny slope, while the shaded crevices and fissures give harbour to such species as *Pellaea mucronata*, *Cheilanthes Lindheimeri* and various mosses, among which *Tortula inermis*, *T. ruralis*, *Barbula Manniae* and *B. chloronotus* are the most in evidence. Where almost any other living thing would wither and perish *Agave Parryi* and *Dasylirion Wheeleri* spread over the ledges and boulders in flourishing clumps that lend a characteristic touch to this unique landscape.

The region about Picture Rocks was another productive locality that proved interesting enough to warrant trips at intervals of about ten days. Some twelve miles west of Tucson, near the far end of the Tucson Mountains in a broad gully fronting the old Indian pictographs, from which the place takes its name, *Anemone sphenophylla* was just coming into bloom on January twelfth, white clusters of *Dryopetalon runcinatum* brightened many of the damp rock fissures, the trim little *Thysanocarpus amplectens* grew sparingly in nearly every depression where sufficient soil had accumulated to support a short span of life during the season of winter rains, while various winter annuals, such as *Lepidium lasiocarpum*, *Draba cuneifolia* and *Amsinckia Menziesii*, were scattered sparingly in the shelter

of shrubs or rocks wherever a bit of moisture and shade was obtainable. Along the dry arroyos leading off through the mountains *Anislotus brachycarpus* and *A. trispermus* were just opening their first flowers, and on the dry flanking talus slopes the omnipresent *Encelia farinosa* in full bloom was temporarily forgotten in the pleasure incident to finding a patch of *Polygala macradenia* with inconspicuous little purple flowers barely visible even at close range.

A similar association of species, including *Dryopetalon*, *Anemone* and *Thysanocarpus*, was observed on the shaded side of a steep ridge at Robles Pass, where scattered pockets of soil had been formed by the disintegrating mosses and lichens, and no doubt a more thorough survey of the region would disclose many similar localities; but the complete isolation of these stations, one from another, is the one factor that seems to be repeatedly emphasized.

Theorizing is always interesting, often productive; but sometimes misleading, yet in the light of these facts one can hardly reject the inference that at some comparatively recent time the forms of plant life, not fitted to thrive in the arid gravel and rock formations of the desert as we find it today, were more widely distributed than they are now, and by progressive changes have been isolated by the rising tide of desert vegetation. Such a condition is plain in outline but difficult to translate into terms that are applicable when the available data are so meagre. Inequality in the distribution of rainfall, the processes of erosion and disintegration and variations in climatic conditions have been some of the contributing causes to the spread and contraction of the various plant communities as we now know them, but to what extent these influences have operated and in what manner the distribution has been modified by complicated cross currents of action and reaction are queries that may be more satisfactorily answered at some future time, when our knowledge of the subject will be more intimate and comprehensive than it is now.

The following list of species, collected between December 23d, 1919, and January 26th, 1920, may be considered as fairly representative of the region within a radus of fifteen miles from Tucson but is necessarily incomplete. Many of the plants listed were in flower and nearly all of them provided with

fruit in a sufficiently good state of preservation to make them easily recognizable.

For assistance in the determination of many of the species I am much indebted to the kindness of Dr. Paul C. Standley.

CHEILANTHES LINDHEIMERI Hook. Frequent on arid ledges and rocky slopes.

CHEILANTHES MYRIOPHYLLA Desv. Less common than the preceding.

CHEILANTHES PRINGLEI Davenp. The finely dissected delicate fronds of this species distinguished it at once from its associates in this region. Infrequent in shaded rock clefts on the lower slopes.

CHEILANTHES WRIGHTII Hook. Infrequent but easily recognized by the smooth green pinnules and lustrous channelled stipes.

NOTHOLAENA HOOKERI D. C. Eaton. Rather common among rocks on arid hillsides. The characteristic outline of the fronds and the bright yellow color of the lower surface are unmistakable marks.

NOTHOLEANA SINUATA (Sw.) Kaulf. Frequent among dry rocks on the lower mountain slopes.

NOTHOLAENA SINUATA INTEGERRIMA Hook. More widely distributed than the typical form of the species.

NOTHOLAENA BONARIENSIS (Willd.) C. Chr. Rare among rocks near the mouth of Sabino Canyon.

NOTHOLAENA LEMMONI D. C. Eaton. Abundant on a dry rocky slope in the mouth of Sabino Canyon but not found elsewhere.

PELLAEA MUCRONATA D. C. Eaton. Ledges and crevices in the foothills. This seems to be the commonest fern of the region.

SELAGINELLA ARIZONICA Maxon. A recently described species forming flat green mats among rocks in the arroyos.

SELAGINELLA RUPICOLA Underw. The grayish color and erect habit are good field marks for this species. Near the mouth of Sabino Canyon it forms dense turfy mats over the dry ledges.

JUNIPERUS SCOPULORUM Sarg. Bank of stream near the mouth of Sabino Canyon. Evidently a stray from the higher ridges.

EPHEDRA TRIFURCATA Torr. Abundant along washes in the gravel plains.

EPHEDRA ANTISYPHILITICA Meyer. Rare in an arroyo near Picture Rocks. The slender flagellate stems give this plant a very different aspect from the more common, stiffly erect, *E. trifurcata*.

EPHEDRA VIRIDIS Coville. Collected but once in the dry foothills at Robles Pass.

ANDROPOGON SACCHAROIDES Sw. Frequent on the plain and foothill.

HETEROPOGON CONTORTUS (L.) Roem. & Schult. More confined to the foothill slopes.

CHAETOCHLOA MACHROSTACHYA (H. B. K.) Scribn. & Merr. Rare on talus slopes at Robles Pass.

CHAETOCHLOA VIRIDIS (L.) Scribn. Introduced in fields and waste places.

ARISTIDA ADSCENSIONIS L. Frequent on hillsides in the Tucson Mountains.

ARISTIDA WRIGHTII Nash. Uncommon on dry slopes in the Tucson Mountains.

ARISTIDA BROMOIDES H. B. K. Common in the foothills. Spikelets developing through the winter.

ARISTIDA DIVERGENS Vasey. Dry slopes in the mouth of Sabino Canyon.

MUHLENBERGIA DUMOSA Scribn. A unique species confined to ledges along the trail in Sabino Canyon at about 3000 feet elevation.

MUHLENBERGIA MICROSPERMA (D C.) Kunth. Rare in the dry foothills.

MUHLENBERGIA PORTERI Scribn. Common in the shelter of shrubs on the gravel plains.

EPICAMPES RINGENS Benth. Slopes in the mouth of Sabino Canyon.

BOUTELOUA FILIFORMIS (Fourn.) Griffiths. Flowering plants collected in Sabino Canyon on January 3d.

BOUTELOUA ROTHROCKII Vasey. The dark brown spikelets persist well through the winter.

BOUTELOUA PARRYI (Fourn.) Griffiths. This and the preceding species are abundant near Robles Pass.

TRICHLORIS FASCICULATA Fourn. Roadsides south of Tucson.

DASYOCHLOA PULCHELLA (H. B. K.) Willd. Generally distributed over the plains.

KOELERIA CRISTATA (L.) Pers. Along streams in the foothills of the Santa Catalina Mountains.

ERAGROSTIS MEGASTACHYA (Koel.) Link. A weed of waste places.

POA BIGELOVII Vasey & Scribn. Confined to damp ledges near Picture Rocks.

CYPERUS CYRTOLEPIS Torr. & Hook. Edge of stream east of Pima Canyon.

JUNCUS NODOSUS L. Edge of stream in Pima Canyon.

YUCCA ELATA Engelm. Single plants scattered over the plains but nowhere abundant.

YUCCA BACCATA Torr. Thickets in the mouth of Sabino Canyon. Apparently washed down from the higher levels.

NOLINA MICROCARPA S. Wats. With the preceding.

DASYLIRION WHEELERI S. Wats. On dry ledges in the foothills.

DIPTEROSTEMON PAUCIFLORUS (Torr.) Rydb. Sparingly in flower along an arroyo near Picture Rocks.

AGAVE PARRYI Engelm. On dry ledges in the mouth of Sabino canyon.

POPULUS WISLIZENI (S. Wats.) Sarg. Catkins fully developed and falling by late January.

QUERCUS ARIZONICA Sarg. Scattered along the creek near the mouth of Sabino Canyon.

QUERCUS EMORYI Torr. With the preceding but more abundant and larger.

QUERCUS HYPOLEUCA Engelm. Sterile but easily recognized by the leathery leaves densely white woolly beneath.

QUERCUS OBLONGIFOLIA Torr. This and the preceding species of oaks are all confined to the lower end of Sabino Canyon, where they seem to exist as waifs carried down by the stream from higher levels in the region about Mt. Lemmon.

CELTIS PALLIDA Torr. Frequent along arroyos in the Tucson Mountains.

PARIETARIA OBTUSA Rydb. Localized on a shaded ledge near Picture Rocks.

PHORADENDRON MACROPHYLLUM (Engelm.) Cockerell. Abundant on *Populus* in the plains and foothills.

PHORADENDRON CALIFORNICUM Nutt. The abundant small red berries and bare stems make a very attractive combination. Chiefly on Mesquite in the plains.

ERIOGONUM POLYCLADON Benth. Recognizable but long past flowering.

ERIOGONUM PINETORUM Greene. Long past flowering but leaves and fruit persistent enough for identification.

ERIOGONUM WRIGHTII Torr. Widely distributed over arid rocky slopes in the foothills.

RUMEX HYMENOSEPALUS Torr. Common in sandy areas throughout the plains.

POLYGONUM PUNCTATUM Ell. Edge of stream in the foothills of the Santa Catalina Mountains.

ATRIPLEX CANESCENS (Pursh) Nutt. Several forms of this species are abundantly over the plains.

ATRIPLEX ROSEA L. Young plants in the sandy bed of an arroyo near Picture Rocks.

CHENOPODIUM PAGANUM Reichenb. Sparingly introduced in waste places.

AMARANTHUS PANICULATUS L. A common weed of fields and waste places.

WEDELIELLA INCARNATA (L.) Cockerell. Flowering sparingly in sunny talus slopes in the foothills.

HESPERONIA RETRORSA (Heller) Standl. Dry slopes near Picture Rocks.

COMMICARPUS SCANDENS (L.) Standl. Localized in rock clefts along an arroyo west of Tucson.

ANEMONE SPHENOPHYLLA Poepp. Frequent among rocks along arroyos in the foothills. In full flower by mid-January.

CLEMATIS DRUMMONDII Torr. & Gray. Frequent on the plains west of Tucson.

ESCHSCHOLTZIA MEXICANA Greene. A few flowers on sheltered banks in January.

THYSANOCARPUS AMPLECTENS Greene. Locally abundant in damp pockets near Picture Rocks and at Robles Pass. Sparingly in flower on January 12th but plentiful and in mature fruit ten days later. The curious disk-shaped pods with perforated wing margins mark this off at once from all other crucifers of the region.

STREPANTHUS ARIZONICUS S. Wats. Frequent in the shade of bushes near Picture Rocks.

LEPIDIUM HIRSUTUM Rydb. Infrequent on lower slopes of Santa Catalina Mountains.

LEPIDIUM LASIOCARPUM Nutt. Common in sandy plains and dry washes.

LESQUERELLA FENDLERI (Gray) S. Wats. Flowering early along dry roadsides and on open slopes in the foothills.

LESQUERELLA PURPUREA (Gray) S. Wats. An attractive early flower of rock crevices in the foothills and lower slopes of the canyons. In vigorous tufts the stems sometimes attain a length of nearly two feet.

DRABA CUNEIFOLIA Nutt. Widely distributed on shaded knolls and banks along the arroyos.

ARABIS PERENNANS S. Wats. The purple flowers give quite a touch of color to the ledges along the arroyos west of Tucson.

BRASSICA NIGRA (L.) Koch. Occasional in cultivated fields.

SOPHIA OCHROLEUCA Wooton. Frequent in sheltered shady spots.

DRYOPETALON RUNCINATUM Gray. Rather local in damp shaded rock pockets. The delicate white flowers form a pleasing contrast with their rough arid setting.

SEDUM GRIFFITHSII Rose. Ledges in Sabino Canyon.

FENDLERA RUPICOLA Gray. Ledges in Sabino Canyon. Leaves and old fruit persistent.

PHILADELPHUS MICRPOHYLLUS Gray. Frequent on open rocky slopes in the foothills. In sheltered places the flowers were opened in profusion by mid January.

PLATANUS WRIGHTII S. Wats. In the mouth of Sabino Canyon.

VAUQUELINA CALIFORNICA (Torr.) Sarg. Ledges in Sabino Canyon at about 300 feet elevation.

CALLIANDRA ERIOPHYLLA Benth. One of the most attractive of the early spring flowers. Abundant on open rocky slopes in the foothills.

ACACIA CONSTRICTA Benth. Frequent on the plains. Pods more persistent than *A. Greggii*.

ACACIA GREGGII Gray. This and *A. constricta* are characteristic thorny shrubs of the gravel plains.

PROSOPSIS GLANDULOSA Torr. This is the main source of firewood for the region.

ACUAN JAMESII (Torr. & Gray) Kuntze. Pods persistent through the winter.

CASSIA COVESII Gray. Scattered sparingly over the open gravel plains. Pods and leaves persistent.

HOFFMANSEGGIA DENSIFLORA (Benth.) Gray. On sandy plains. Pods persistent.

PARKENSONIA MICROPHYLLA Torr. A thorny shrub or small tree of the foothills and adjacent plains. On sheltered sunny slopes a few flowers were in evidence by late January.

CERCIDIUM TORREYANUM Sarg. A low nearly leafless shrub occuring sparingly along washes in the plains.

KRAMERIA GLANDULOSA Rose & Painter. A straggling flowerless shrub of the plains with soft silky pubescent young growth.

ANISLOTUS BRACHYCARPUS (Benth.) Rydb. The broad leaflets and villous pubescence separate this species sharply from the following where they grow together.

ANISLOTUS TRISPERMUS (Greene) Woot. & Standl. With the preceding in a sandy bed of an arroyo near Picture Rocks. Just coming into flower.

ANISLOTUS PUBERULUS (Benth.) Woot. & Standl. What seems to be a form of this species was in full flower on the ledges of Sabino Canyon at about 3000 feet elevation.

PAROSELLA PARRYI (Torr. & Gray.) Heller. This inconspicuous little plant is quite typical of arid rocky hillsides in the foothills.

PAROSELLA GREGGII (Gray) Heller. Abundant on rocky spurs and slopes near Agua Calgiente but not observed elsewhere.

NISSOLIA SCHOTTII (Torr.) Gray. Pods and leaves persistent. Frequent.

ASTRAGALUS NUTTALLIANUS DC. Local on the plains. In flower in January.

CRACCA TENELLA Gray. Localized on dry sunny ledges near Robles Pass.

GALACTIA WRIGHTII Gray. Twining over low bushes in the foothills. Leaves and pods persistent.

OLNEYA TESOTA Gray. Foothill slopes and nearby plains.

ERODIUM CICUTARIUM (L.) L'Her. Abundant in waste places and on open sandy plains.

ERODIUM TEXANUM Gray. Gravelly Knolls near Picture Rocks.

COVILLEA GLUTINOSA (Engelm.) Rydb. The most abundant and characterisitc shrub of the plains.

KOEBERLINIA SPINOSA Zucc. Frequent on knolls and in thickets in the plains.

JANUSIA GRACILIS Gray. Twining about bushes on open rocky hillsides.

RUTOSMA PURPUREA Woot. & Standl. Frequent on banks of the arroyos west of Tucson.

POLYGALA MACRADENIA Gray. Confined to a rocky hillside near Picture Rocks.

EUPHORBIA CAPITELLATA Engelm. Forming quite showy mats on ledges and in crevices along the arroyos west of Tucson.

EUPHORBIA PEDICULIFERA Engelm. A form with densely glandular pubescent stems and leaves is not uncommon.

EUPHORBIA POLYCARPA Benth. This and the two preceding species of the genus are freely distributed over the arid ridges and talus slopes. They all belong to the group of perennials with entire pubescent leaves and vary considerably in habit and appearance.

DITAXIS NEOMEXICANA (Muell. Arg.) Heller. The lax straggling habit of this species is very different from the stiff erect form of *D. sericophylla.*

DITAXIS SERICOPHYLLA (Gray) Heller. With the preceding on rocky slopes at Robles Pass.

CALLITRICHE PALUSTRIS L. In shallow water at the mouth of Sabino Canyon.

SIMMONDSIA CALIFORNICA Vutt. A striking evergreen bush of the dry plains and foothills with leathery leaves and yellow flowers in drooping axillary clusters.

DODONAEA VISCOSA L. Abundant along the stream bank in the mouth of Sabino Canyon.

CONDALIA SPATHULATA Gray. Banks of arroyos near the foothills. Leaves and fruits persistent.

RHAMNUS TOMENTELLA Benth. Ledges in Sabino Canyon at about 3000 feet elevation.

HIBISCUS COULTERI Harv. Flowering sparingly through the winter.

HIBISCUS DENUDATUS Benth. The pale almost leafless stems and delicately tinted pink flowers give this plant an attractive personality. Rare on open slopes at Robles Pass.

GAYOIDES CRISPUM (L.) Small. Frequent on rocky slopes.

ABUTILON INCANUM (Link) Sweet. Common on rocky hillsides. Leaves and carpels persistent.

SPHAERALCEA AMBIGUA Gray. A polymorphous species widely scattered over the region. Flowers white or pink and leaves varying greatly in outline.

SPHAERALCEA GROSSULARIAEFOLIA York. On rocky slopes at Robles Pass.

HERMANNIA PAUCIFLORA S. Wats. Confined to rocky slopes near the mouth of Sabino Canyon.

AYENIA PUSILLA L. Frequent on the dry gravel plains.

FOUQUIERIA SPLENDENS Engelm. Although the leaves were well developed in sunny sheltered places no flowers were in evidence by the end of January.

OPUNTIA FULGIDA Engelm. Common on the plains.

OPUNTIA ARBORESCENS Engelm. Forming impenetrable thickets on the plains.

OPUNTIA LEPTOCAULIS DC. The common slender stemmed cholla of the region.

OPUNTIA BIGELOVII Engelm. Frequent on arid rocky slopes in the foothills.

OPUNTIA CHOLOROTICA Engelm. & Bigel. On ledges near the mouth of Sabino Canyon.

OPUNTIA TOUMEYI Rose. Frequent on the gravel plains.

MAMILLARIA GRAHAMI Engelm. Frequent in small colonies among rocks in the foothills. The diminutive scarlet pipe-shaped fruits are very attractive.

ECHINOCACTUS WISLIZENI Engelm. Scattered sparingly over the foothill slopes. Some plants are well over a meter in height.

ECHINOCEREUS FENDLERI (Engelm.) Rümpl. Forming clumps in gravel plains near the foothills.

CEREUS GIGANTEUS Engelm. The sahuaro well merits the reputation of being one of the most unique and striking elements of the desert vegetation.

DAUCUS PUSILLUS Mx. Scarce on shaded knolls in the washes.

PLUMBAGO SCANDENS L. In the foothills of the Santa Catalina Mountains. Leaves and fruit persistent.

FORESTERIA PHILLYREOIDES Torr. This is a Mexican type and Dr. Standley informs me they have but one other specimen from the United States, collected at Tucson by Pringle. The staminate flowers were fully developed by December 30th and a few leafy shoots supplied the foliage characters. On rocky slopes along the Ajo road west of Tucson.

FRAXINUS ATTENUATA Jones. In the mouth of Sabino Canyon.

MENODORA SCABRA Gray. On arid slopes of the Tucson Mountains

HAPLOPHYTON CIMICIDUM A. DC. Rare on rocky talus slopes at Robles Pass.

ASCLEPIAS LINARIA Cav. Frequent on ledges in the lower slopes of the Santa Catalina Mountains.

PHILIBERTELLA LINEARIS Gray. Twining over bushes on dry rocky hillsides.

EVOLVULUS LINIFOLIUS L. An inconspicuous little perenial with fugitive flowers. Frequent among rocks and dry ledges in the foothills.

JACQUEMONTIA PRINGLEI Gray. Not uncommon on rocky hillsides. Leaves and capsules persistent.

PECTOCARYA LINEARIS (R. & P.) DC. Locally abundant on a gravel shelf near Picture Rocks.

AMSINCKIA MENZIESII (Lehm.) Nels. & Macb. Flowering with *Thysanocarpus* and *Dryopetalon* on shaded ledges at Picture Rocks.

VERBENA WRIGHTII Gray. This is one of the showiest of the early flowers in the foothills, where it blooms profusely in January.

VERBENA XUTHA Lehm. Rare and local on dry slopes of the Tucson Mts.

LIPPIA WRIGHTII Gray. Rocky slopes in the foothills. Leaves and nutlets persistent.

MARRUBIUM VULGARE L. A very common weed of roadsides and waste places.

MESOSPHAERUM EMORYI (Torr.) Kuntze. Flowering through the winter and very characterisric of arid rocky slopes in the foothills.

HEDEOMA OBLONGIFOLIA (Gray) Heller. Ledges in the mouth of Sabino Canyon.

HEDEOMA NANA (Torr.) Greene. In rock crevices along arroyos west of Tucson. The leaves and fruit of this and the preceding are persistent through the winter.

SALVIA PINGUIFOLIA (Fernald) Woot. & Standl. On rocky hillside at Robles Pass. Buds well developed but not in flower.

NICOTIANA TRIGONOPHYLLA Dunal. A common plant of dry ledges in the foothills. In flower throughout the winter.

NICOTIANA GLAUCA Graham. An introduced shrub of waste places.

LYCIUM COOPERI Gray. Frequent on rocky slopes.

LYCIUM FREMONTII Gray. Ledges at the mouth of Sabino Canyon. In full flower on January 6th.

LYCIUM PARVIFLORUM Gray. A thorny straggling shrub of the gravel plains.

LYCIUM TORREYI Gray. Confined to the slopes near Picture Rocks.

PHYSALIS IXOCARPA Brot. Infrequent in the Tucson Mountains.

ANTIRRHINUM ANTIRRHINIFLORUM (Willd.) Hitchc. On slopes of the Tucson Mountains. Leaves and capsules persistent.

SCROPHULARIA PARVIFLORA Woot. & Standl. Flowering sparingly on January 20th in the mouth of Pima Canyon, Santa Catalina Mountains.

PENTSTEMON SUPERBUS A. Nels. Sandy washes in the foothills. Flowering freely in January.

MIMULUS LANGSDORFII Don. Shallow water in a brook east of the mouth of Pima Canyon.

MECARDONIA PEDUNCULARIS (Benth.) Small. Abundant in a brook east of the mouth of Pima Canyon. This species seems to flower and mature fruit throughout the winter.

STEMODIA DURANTIFOLIA (L.) Sw. In shallow water with the two preceding.

DIAPEDIUM TORREYI (Gray) Woot. & Standl. Arid slopes near Agua Caliente. The large cordate bracts, fading white and papery, give this plant a unique appearance in the field.

CARLOWRIGHTIA ARIZONICA Gray. Leaves and capsules persistent enough for identification.

SIPHONOGLOSSA LONGIFLORA (Torr.) Gray. Frequent on arid slopes west of Tucson. Leaves and capsules persistent.

RUELLIA TUBEROSA OCCIDENTALIS Gray. Infrequent near Picture Rocks. Old capsules persistent.

CHILOPSIS LINEARIS (Cav.) Sweet. Along arroyos in the foothills.

STENOLOBIUM INCISUM Rose & Standl, Rocky ledges and crevices among the foothills. The persistent leaves and showy yellow capsules make this a clean and attractive plant throughout the winter.

GALIUM STELLATUM Kellogg. This plant makes considerable growth from a diffuse woody base during the winter, but there was no evidence of bloom by January 30th. Frequent on ledges and rocky hillsides.

SAMBUCUS MEXICANA Presl. Frequent along water courses and in cultivation. In bloom by mid-January.

PTILORIA PAUCIFLORA (Torr.) Raf. A common plant of the arid plains and foothills blooming through the winter.

PEREZIA WRIGHTII Gray. In full flower on January 21st. Infrequent on arid rocky slopes near Picture Rocks.

TRIXIS CALIFORNICA Kellogg. In full flower during January. Abundant and quite showy among rocks in the foothills.

HYMENOCLEA MONOGYRA Torr. & Gray. A tall slender weed-like shrub with persistent filiform leaves and winged fruit. In the mouth of Pima Canyon.

FRANSERIA DELTOIDEA Torr. One of the characteristic plants of dry gravel plains near the foothills. Buds well developed by January 30th but no flower.

EUPATORIUM SOLIDAGINIFOLIUM Gray. Ledges at the mouth of Sabino Canyon.

COLEOSANTHUS BACCHARIDEUS (Gray) Kuntze. Infrequent on ledges near the mouth of Pima Canyon. Leathery leaves and flower heads very persistent.

COLEOSANTHUS COULTERI (Gray) Kuntze. Common on rocky hillsides.

COLEOSANTHUS WRIGHTII (Gray) Britton. Ledges in the mouth of Sabino Canyon.

GYMNOSPERMA CORYMBOSUM DC. Confined to the mouth of Pima Canyon.

GUTIERREZIA GLOMERELLA Greene. Leaves and old heads persistent. Frequent on the plains.

SIDERANTHUS AUSTRALIS (Greene) Rydb. Common on the gravel plains.

ISOCOMA HARTWEGI (Gray) Greene. Forming dense clumps on ridges and knolls in the gravel plains.

CHRYSOMA LARICIFOLIA (Gray) Greene. Rock clefts and ledges in the arid foothills. Flowering casually through the winter months.

BACCHARIS GLUTINOSA Pers. Common along the banks of Rillito Creek.

BACCHARIS SAROTHROIDES Gray. Abundant on the sand bars and banks of Rillito Creek.

ERIGERON DIVERGENS Torr. & Gray. This is apparently an abnormal winter form of the species but very constant throughout the region. It is scattered freely over the rocky foothill slopes and flowers during January.

GNAPHALIUM WRIGHTII Gray. Frequent on arid rocky slopes.

PARTHENIUM INCANUM H. B. K. A common low shrub of the foothills. In good conditions through the winter,

CRASSINA PUMILA (Gray) Kuntze. Occurring sparingly on dry gravelly mesas.

ENCELIA FARINOSA Gray. The distinctive gray color of many of the desert slopes is derived from the lustrous silvery leaves of this species. The showy yellow flowers are locally abundant, even in January, and it may well be numbered among the most satisfying and attractive plants of the region.

LEPTOSYNE ARIZONICA Gray. Bank of a stream in the mouth of Pima Canyon.

POROPHYLLUM JUNCIFORME Greene. A rush-like plant of ledges and rocky slopes in the foothills.

DYSODIA POROPHYLLOIDES Gray. Rare on ledges near Picture Rocks.

PSILOSTROPHE COOPERI (Gray) Greene. Fresh flowers among the persistent papery old blooms are found sparingly in January. Frequent on the gravel plains.

BAILEYA MULTIRADIATA Harv. & Gray. Frequent and showy in sandy plains, especially along roadsides. Flowering freely by late January.

PERITYLE DISSECTA Gray. An attractive little plant with curiously cleft leaves and persistent involucres. In rock clefts near the mouth of Pima Canyon.

BAHIA DEALBATA Gray. Arroyos in the Tucson Mountains.

HELENIUM MONTANUM Nutt. Localized along the bank of a stream east of the mouth of Pima Canyon.

ARTEMISIA ALBULA Wooton. Arid foothill slopes Abundant near Agua Caliente.

ARTEMISIA BRITTONII Rydb. Ledges in Sabino Canyon.

BEBBIA JUNCEA (Benth.) Greene. An attractive slender stemmed plant of the sandy plains.

SENECIO LEMMONI Gray. Flowering rather sparingly on rocky slopes in the foothills.

CIRSIUM NEOMEXICANUM Gray. Infrequent along roadsides in the gravel plains.

BUSHKILL, PENNSYLVANIA

Two new genera of Cactaceae

N. L. Britton and J. N. Rose

In our recent study of the genus *Echinocactus*, we have segregated a number of new genera, and restored several previously published, among which are *Malacocarpus*, *Gymnocalycium*, and *Discocactus*, all composed of species native to South America. Among the North American segregates are the two described below, which do not belong even to the same subtribe as *Echinocactus*.

THELOCACTUS (Schumann)

Echinocactus subgenus *Thelocactus* Schumann, Gesamtb. Kakteen 429. 1898.

Cacti of medium size, one-jointed, solitary or caespitose, globose or somewhat depressed, spiny, often densely so; ribs few, low or even indistinct, often spiraled, divided into large tubercles, the flowering ones more or less grooved above; flowers from near the center of the plant, borne on very young tubercles, rather large for the subtribe, campanulate, diurnal; scales on the ovary usually few, their axils naked; fruit, so far as known, dry, dehiscing by a basal pore; seeds numerous, black, finely tuberculate, with a large basal hilum.

Type species: *Echinocactus hexaedrophorus* Lemaire.

The generic name refers to the tubercled ribs.

1. **Thelocactus hexaedrophorus** (Lemaire) comb. nov.
   Echinocactus hexaedrophorus Lemaire, Cact. Gen. Nov. Sp. 27. 1839.

2. **Thelocactus bicolor** (Galeotti) comb. nov.
   Echinocactus bicolor Galeotti in Pfeiffer, Abbild. Beschr. Cact. **2**: *pl.* 25. 1848.

3 **Thelocactus lophothele** (Salm-Dyck) comb. nov.
   Echinocactus lophothele Salm-Dyck, Allg. Gartenz. **18**: 395. 1850.

NEOLLOYDIA gen. nov.

Small, more or less caespitose plants, fibrous-rooted, cylindric, one-jointed, densely spiny, tubercled; tubercles borne on spiraled ribs, grooved above; radial spines numerous, widely spreading;

central spines one to several, much stouter and longer than the radials; flowers large, pink or purple, subcentral from the axils of nascent tubercles, their segments widely spreading; fruit compressed-globose, dull colored, thin-walled, becoming papery, dry, with few scales or none; seeds globose, black, dull, tuberculate-roughened, with a large light basal scar.

Type species: *Mammillaria conoidea* De Candolle.

The genus is dedicated to Professor Francis E. Lloyd.

1. **Neolloydia conoidea** (De Candolle) comb. nov.

Mammillaria conoidea De Candolle, Mém. Mus. Hist. Nat. Paris **17**: 112. 1828.

Echinocactus conoideus Poselger, Allg. Gartenz. **21**: 107. 1853.

2. **Neolloydia Beguinii** (Weber) comb. nov.

Echinocactus Beguinii Weber in Schumann, Gesamtb, Kakteen 442. 1898.

INDEX TO AMERICAN BOTANICAL LITERATURE

1908–1921

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to foresty, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

This Index is reprinted monthly on cards, and furnished in this form to subscribers at the rate of three cents for each card. Selections of cards are not permitted; each subscriber must take all cards published during the term of his subscription. Correspondence relating to the card issue should be addressed to the Treasurer of the Torrey Botanical Club.

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